

1 WHAT IS CLAIMED IS:

- 2
- 3 1. An optical switch array assembly comprising:
- 4 a silicon substrate,
- 5 an optical switch array disposed in the silicon substrate,
- 6 a driving circuit integrated in the silicon substrate with the optical
- 7 switch array and forcing the optical switches on and off, and
- 8 a plurality of holes on the backside of the silicon substrate each
- 9 aligned with an optical switch and guiding an optical beam to the optical switch.
- 10
- 11 2. An optical switch array assembly of claim 1 further comprising an
- 12 addressing circuit integrated in the silicon substrate with the optical switch array
- 13 and locating each optical switch.
- 14
- 15 3. An optical switch array assembly of claim 1 further comprising a glass
- 16 plate mounted on the top of the silicon substrate.
- 17
- 18 4. An optical switch array assembly of claim 1 further comprising a plurality
- 19 of DNA probes disposed on the surface of the glass plate.
- 20
- 21 5. An optical switch array assembly of claim 1 further comprising a plurality
- 22 of hybridized DNA probes disposed on the surface of the glass plate.
- 23
- 24

6. An optical switch array assembly according to claim 1, where said optical switches are Fabry-Perot cavity based optical switches.

7. An optical switch array assembly according to claim 4, where said DNA probes are light-synthesized DNA probes.

8. An optical switches array assembly according to claim 1, where said optical switches can be switched on and off for releasing and blocking said optical beams.

9. An optical switch array assembly according to claim 4, where said light beams are directed to sites where said DNA probes are light-synthesized.

10. An optical switch array assembly according to claim 5, where said light beams are directed to sites where said hybridized DNA probes are light-detected.

11. A method of making an optical switch array assembly comprising the steps:

preparing a silicon substrate with a driving circuit and an addressing circuit fabricated based on a standard MOSFET process, depositing an anti-reflective layer on the surface of the silicon substrate,

1 depositing a first mirror layer on the surface of the anti-reflective
2 layer,
3 depositing a sacrificial layer on the surface of the first mirror layer,
4 depositing a second mirror layer on the sacrificial layer,
5 forming a plurality of refilled trenches to define a plane
6 configuration for a Fabry-Perot cavity,
7 performing metallization to form electrical interconnections and
8 spacers,
9 performing deep etching to create holes on the backside of the
10 substrate, and
11 mounting a glass plate on the top of the substrate.

12
13 12. A method of making an optical switch array assembly according to
14 claim 11, further comprising a step for synthesizing a DNA probe array on
15 said glass plate by light illumination.

16
17 13. A method of making an optical switch array assembly, according to
18 claim 11 where said anti-reflective layer is a silicon dioxide layer.

19
20 14. A method of making an optical switch array assembly, according to
21 claim 11 where said first mirror layer is an amorphous silicon carbide
22 layer.

15. A method of making an optical switch array assembly, according to claim 11 where said first mirror layer is a silicon nitride layer.

16. A method of making an optical switch array assembly, according to claim 11 where said sacrificial layer is a silicon dioxide layer.

17. A method of making an optical switch array assembly, according to claim 11 where said sacrificial layer is an aluminum layer.

18. A method of making an optical switch array assembly, according to claim 11 where said second mirror is an amorphous silicon carbide layer.

19. A method of making an optical switch array assembly, according to claim 11 where said second mirror layer is a silicon nitride layer.

20. A method of making an optical switch array assembly, according to claim 11 where said refilled trenches are filled with silicon dioxide.

21. A method of making an optical switch array assembly, according to claim 11 where said refilled trenches are filled with an amorphous silicon-silicon dioxide-amorphous silicon sandwiched plug.

1 22. A method of making an optical switch array assembly, according to
2 claim 11 where said refilled trenches are filled with an amorphous silicon-silicon
3 dioxide-amorphous silicon sandwiched plug.
4
5
6
7
8
9

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24